

**THE ASSOCIATION OF GENDER WITH THE PATTERNS OF IMPACTIONS AND ASSOCIATED RADIOLUCENCY'S IN MANDIBLE AND MAXILLA**

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**ABSTRACT****OBJECTIVES**

*To find the association between gender and the patterns of impactions and associated radiolucency in Mandible and Maxilla.*

**METHODOLOGY**

*A cross-sectional descriptive study was conducted on 385 Orthopantomograms (OPG) of patients visiting Sharif Medical and Dental College (SMDC), Services Institute of Medical Sciences (SIMS) and Institute of Dentistry, CMH, Lahore Medical College, Lahore over a period of three months from December 2020 to February 2021. The angle of the impacted third molar was classified using Winters classification. The Pell and Gregory classification was used for depth of third molar impaction and ramus relationship of mandibular third molars. Statistical analysis was done using SPSS 23 and a P value  $\leq 0.05$  was considered significant.*

**RESULTS**

*The angle of impaction and gender in impacted mandibular third molars were significantly associated with each other ( $p=0.011$ ) while the depth of impaction ( $p=0.729$ ), and ramus relationship ( $p=0.318$ ) were not significantly associated with gender. The association between gender and periapical radiolucency ( $p=0.605$ ), peri coronal radiolucency ( $p=0.591$ ), caries ( $p=0.499$ ) and external resorption ( $p=0.499$ ) were non-significant. In maxillary impacted third molars the association between gender and depth of impaction ( $p=0.121$ ), angle of impaction ( $p=0.284$ ), periapical radiolucency ( $p=0.111$ ), peri coronal radiolucency ( $p=0.805$ ) and caries ( $p=1.000$ ) were non-significant.*

**CONCLUSION**

*In impacted mandibular third molars the periapical, peri coronal radiolucency, caries and external resorption were more in the males as compared to the females. In maxillary third molar impactions, the periapical radiolucency radiolucency was greater in males while peri coronal radiolucency was greater in females.*

**KEYWORDS:** *Third Molar Impactions, Gender, Angle of Impaction, Periapical Radiolucency, Peri coronal Radiolucency, Caries*

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**INTRODUCTION**

Tooth impaction is a term used to describe a tooth that fails to erupt into its proper functional position within the dental arch in the expected time frame.<sup>1</sup> Alternatively, defined as those teeth are prevented from erupting into their proper functional position by any physical barrier in the eruption path.<sup>1</sup> Different people have different versions of describing impacted teeth. Full impaction state is defined as the impaction of two-thirds or more of the crown of the third molar within the alveolar bone.<sup>2</sup> An impacted tooth has been defined as a tooth that is prevented from erupting because of malposition, lack of space, or other impediments. The most impacted teeth are third molars with the frequency of impaction of mandibular third molars being higher than maxillary third molars.<sup>3</sup> Maxillary and Mandibular third molars erupt between the age of 17 to 21 years and are the last tooth to erupt despite the racial variation. They become impacted because of local and systemic factors that include, lack of space in the jaw, the aberrant path of eruption, dense overlying bone, or soft tissue, abnormal positioning of tooth buds, pathological lesions such as Dentigerous cyst, and certain syndromes that cause impaction of teeth.<sup>4</sup> Assessment of depth, position, and angulations of impacted third molars determines their difficulty index.<sup>5</sup> The position can be assessed by a method devised by Pell and Gregory where the level of the impacted third molars is assessed by the neighboring second molars.<sup>6</sup> Pell & Gregory's classification for lower third molars. Horizontal classification; PGH-1: normal apical area, PGH-2: moderate apical area, PGH-3: small apical area. Vertical classification: PGV-1: the occlusal plane of the third molar is at the same level as the occlusal plane of the second molar, PGV-2: the occlusal plane of the third molar is located between the occlusal plane and the cervical margin of the second molar, PGV-3: the occlusal plane of the third molar is below the

cervical margin of the second molar.<sup>7,8</sup> The angle of impaction can be assessed using Winter's Classification system. It is determined by the angle formed between the intersected longitudinal axes of the second and third molars.<sup>9</sup> Aside from different etiological factors, a few studies tried to determine if there are any gender variations associated with third molar impaction.<sup>10</sup> Previous studies reported no statistically significant difference while another study reported a significant association between gender and the number of impacted teeth as well as the presence of impacted mandibular teeth.<sup>11</sup> Along with impactions, they may acquire a range of patterns and positions that can lead to diverse pathologies.<sup>12</sup> Although impacted third molars may remain symptom-free indefinitely, they could give cause various symptoms and pathologies, such as pericoronitis, pain, swelling, distal caries, bone loss, root resorption of adjacent teeth, odontogenic cysts and tumors.<sup>13</sup> Clinical and radiographic examinations not only facilitate to the classification of these teeth but also help to diagnose and differentiate different pathologies associated with them.<sup>14</sup> There are many studies which have been conducted to find the association of pathologies associated with impacted third molars but there are very few studies that have studied the difference in the patterns of impactions of third molars and the oral pathologies associated with these teeth with respect to gender. The aim of this study was to find the association between gender and the patterns of impactions and associated radiolucency in Mandible and Maxilla.

**METHODOLOGY**

A cross-sectional descriptive study was conducted on 385 Orthopantomograms (OPG) of patients visiting Sharif Medical and Dental College (SMDC), Services Institute of Medical Sciences (SIMS) and Institute of Dentistry, CMH, Lahore Medical College, Lahore over a period of three months from December 2020 to February 2021. The sample size was calculated keeping the confidence level 95%, anticipated population proportion 0.462, absolute precision 0.05 and was determined to be 383.<sup>15</sup> The Sampling technique used was non-probability convenience sampling. Ethical approval was obtained from the Sharif Medical Research Centre (SMRC) before the commencement of the study. Patients above the age of 21 years were included in this study. Grossly carious third molars with inadequate tooth structure to be evaluated and patients with missing maxillary and mandibular third molars were

excluded from the study. Orthopantomograms (OPG) were obtained from the radiology department of Sharif Medical and Dental College (SMDC), Services Institute of Medical Sciences (SIMS) and Institute of Dentistry, CMH, Lahore Medical College, (CMH) Lahore. The panoramic machine model used was Asahi AutoIII ECM, input power 1.5 kVA, tube current 10mA Constant, tube voltage 60-90 kV, exposure time 12sec (continuous), total filtration 2.8mmAl (min), Metal flat cassette 8" x 10" (Attached grid: 34lines/cm) (Grid ratio:5/1), 203 x 254 mm Kodak T-Mat G film, Kodak lanex regular (1\*) intensifying screen. The OPGs were evaluated for the Mandibular and Maxillary Third molar impactions. The impacted molars were then analyzed with respect to the angle, depth of impaction and associated radiolucency in the case of mandibular molars and maxillary molars. The mandibular molars were also analyzed with respect to the ramus relationship. The angle of the impacted third molar was classified using Winter's classification.<sup>16</sup> The Pell and Gregory classification was used for depth of third molar impaction and ramus relationship of mandibular third molars.<sup>17</sup> The criteria used for evaluating the associated radiolucency with impacted third molars and second molars in the presence of impacted third molars. Statistical analysis was done using SPSS 23 and a P value  $\leq 0.05$  was considered significant. Chi-square test was used to find the association of gender and depth of impaction, angle of impaction, ramus relationship, periapical radiolucency, peri coronal radiolucency and caries while fisher exact test was used to find the association between gender and external root resorption associated with

impacted third mandibular third molars. Chi-square test was used to find the association between gender and depth of impaction, periapical and peri coronal radiolucency in impacted maxillary third molars while fisher exact test was used to the association of gender with angle of impaction and presence of caries in impacted maxillary third molars. The strength of association of gender with angle of impaction, depth of impaction, ramus relationship in impacted mandibular and maxillary third molars was assessed using the Cramer's V coefficient. The strength of association of gender and periapical and peri coronal radiolucency, caries and external resorption associated with maxillary and mandibular impacted third molars was assessed using Phi coefficient.

## RESULTS

A total of 385 OPG with 840 impacted third molars were examined. The mean age of the patients was  $32.71 \pm 9.198$  years with 49.9% females and 50.1% males. The number of impacted third molars in the mandible was 605 with 299 in the right mandible and 306 in the left mandible while that in the Maxilla was 235 with 112 in the right maxilla and 123 in the left maxilla. Table 1 shows a statistically significant weak positive association between gender and angle of impaction with Mesioangular impaction being the highest and Buccolingual being the least in both the genders in impacted mandibular third molars. A very weak statistically non-significant association of gender with a depth of impaction and ramus relationship of the impacted third molar was seen.

**Table 1: Association of Gender and Parameters of Impaction in Mandibular Third Molars**

Parameters of Impaction		Gender		P-Value	Cramer's V Co-efficient
		Male f(%)	Female f(%)		
Depth of Impaction	Class A	135(22.35%)	136(22.5%)	0.729	0.032
	Class B	114(18.8%)	113(18.7%)		
	Class C	58(9.6%)	49(8.1%)		
Angle of Impaction	Vertical	69(11.4%)	86(14.2%)	0.011	0.148
	Mesioangular	140(23.1%)	139(23%)		
	Distoangular	10(1.7%)	18(3%)		
	Horizontal	88(14.5%)	54(8.9%)		
	Buccolingual	0(0%)	01(0.2%)		
Ramus Relationship	Class 1	52(8.6%)	49(8.1%)	0.318	0.062
	Class 2	24(39.8%)	242(40%)		
	Class 3	14(2.3%)	07(1.2%)		

Table 1 Shows a statistically non-significant association between gender and radiolucency associated with the mandibular impacted third molars. It was seen that periapical, peri coronal radiolucency, caries and external resorption were

found to be more in the males as compared to the females. A negligible association between gender and oral radiolucency was demonstrated by the phi-coefficient.

**Table 2: Association of Gender and Oral Pathological Lesions Associated With the Impacted Mandibular Third Molars**

Oral Pathological Lesions		Gender		P-Value	Phi Co-efficient
		Male f(%)	Female f(%)		
Periapical Radiolucency	Yes	275(45.5%)	263(43.5%)	0.605	0.021
	No	32(5.3%)	35(5.8%)		
Pericoronal Radiolucency	Yes	293(48.4%)	287(47.4%)	0.591	-0.022
	No	14(2.3%)	11(1.8%)		
Caries	Yes	10(1.7%)	7(1.2%)	0.499	0.027
	No	297(49.1%)	291(48.1%)		
External Root Resorption	Yes	2(0.3%)	0(0%)	0.499	0.057
	No	305(50.4%)	298(49.3%)		

Table 2 shows a statistically non-significant weak positive association of gender with depth and angle of impacted maxillary third molars. It was seen that class C depth of impaction was the

predominant pattern in both genders. The majority of the males and females had distoangular impactions while the least had horizontal impactions as shown in table 3.

**Table 3: Association of Gender and Parameters of Impaction in Maxillary Third Molars**

Parameters of Impaction		Gender		P-Value	Cramer's V
		Male f(%)	Female f(%)		
Depth of impaction	Class A	0(0%)	0(0%)	0.121	0.101
	Class B	37(15.7%)	30(12.8%)		
	Class C	74(31.5%)	94(40%)		
Angle of Impaction	Vertical	25(10.6%)	27(11.5%)	0.284	0.143
	Mesioangular	20(8.5%)	34(14.5%)		
	Distoangular	63(26.8%)	59(25.1%)		
	Horizontal	01(0.4%)	0(0%)		
	Buccolingual	2(0.9%)	4(1.7%)		

Table 3 shows a statistically non-significant association between gender and oral radiolucency associated with impacted maxillary third molars. It was seen that periapical radiolucency was greater

in males while peri coronal radiolucency was greater in females. A negligible association of gender was found with the periapical and peri coronal radiolucency and caries as shown in table 4.

**Table 4: Association of Gender and Oral Pathological Lesions Associated With the Impacted Maxillary Third Molars**

Oral Pathological Lesions		Gender		P-Value	Phi Co-efficient
		Male f(%)	Female f(%)		
Periapical Radiolucency	Yes	79(33.6%)	76(32.3%)	0.111	0.104
	No	32(13.6%)	48(20.4%)		
Pericoronal Radiolucency	Yes	103(43.8%)	114(48.5%)	0.805	0.016
	No	08(3.4%)	10(4.3%)		
Caries	Yes	0(0%)	01(0.4%)	1.000	-0.062
	No	111(47.2%)	123(52.3%)		

## DISCUSSION

Impacted teeth are teeth which fail to erupt in their anatomic position. Impacted teeth are last in chronologic eruption associated with various types of abnormalities.<sup>18</sup> Impactions are most often associated with pathologies like cysts, Ameloblastoma and abscess.<sup>19</sup> Etiology of impacted molar include lack of space, retardation of facial growth, obstruction due to any underlying pathology like an odontogenic cyst or Dentigerous cyst, and lack of sufficient eruption force.<sup>20</sup> At the time of the mandibular third molar eruption, the

growth has often ended in females while in males, the growth and development of the jaws continue during the eruption of mandibular third molars, and greater space is therefore available for their eruption. In our study, the most common type of impaction according to depth in the mandible was Class A impaction followed by Class B and Class C. Class A type is more common in females (22.5%) while class C impaction is more common in males. Similar results were shown by studies conducted by Iran researchers.<sup>21</sup> In maxilla the most common type of impaction was class C which has a higher frequency in females (40%).

Class A was the least common type in maxilla. In the present study, according to the angle of impaction, Mesio-angular impaction was the most common impaction in mandibular arch. Majority of the patients have Mesio-angular and horizontal impaction. In our study, vertical and distoangular impaction is more common in females. Similarly, in studies conducted in Nigerian and Singaporean populations, Mesio-angular impactions dominated over other patterns of angulation.<sup>22</sup> Distoangular impaction is the most common type of impaction in maxilla in this study and has a higher frequency in males. According to ramus's relationship, 40% of females have class 2 ramus relationships while 39.8% of males have class 2 ramus relationships in the present study. Hence class 2 ramus relationship was the most frequently occurred while class 3 has the lowest frequency. Similar results were reported by another researcher as well.<sup>23</sup> In this study, the most significant finding associated was periapical radiolucency and peri coronal radiolucency. Periapical radiolucency was associated with impacted molars which are slightly more common in males in both mandibular and maxillary third molars. Caries are one of the common pathological features associated with a mandibular third molar and adjacent tooth.<sup>24</sup> In the present study 1.2% of females and, 1% of the male with impacted lower third molars were associated with dental caries.

#### LIMITATION

If the study was a multicenter study, then it would have helped us report more findings which would have been more inclusive of the general population. Therefore, larger sample size and data from different areas would have helped us assess the associations more elaborately.

#### CONCLUSION

Gender and angle of impaction in impacted mandibular third molars were significantly associated with each other and Mesioangular impaction were the highest and Buccolingual was the lowest in both the genders. Similarly, Class A depth of impaction and Class 2 ramus relationship was the most predominant patterns of impactions in both genders. The periapical, peri coronal radiolucency, caries and external resorption were found to be more in the males as compared to the females. In maxillary third molar impactions, the class C depth of impaction was the predominant pattern in both genders. Most of the males and females had distoangular impactions while the least had horizontal impactions. The periapical radiolucency was greater in males while peri

coronal radiolucency was greater in females.

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